U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Indigofera mucronata* Spreng. ex DC. var. *keyensis* (Small) Isely (= *Indigofera trita* var. *keyensis*)

COMMON NAME: Florida indigo, Keys indigo, Asian indigo

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

_X_ Continuing candidate

___ Non-petitioned

_X_ Petitioned - Date petition received: May 11, 2004

__ 90-day positive - FR date:

__ 12-month warranted but precluded - FR date:

__ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

___ Listing priority change

Former LP: ___
New LP: ___

Date when the species first became a Candidate (as currently defined): October 25, 1999

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Fabaceae (Leguminosae), Pea Family

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, U.S.A.

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, Monroe County, U.S.A.

LAND OWNERSHIP

Florida indigo is currently known from Crawl Key (private), John Pennekamp Coral Reef State Park on Key Largo, Long Key State Park, Long Point Key (private), Plantation Key (private), Windley Key Fossil Coral Reef State Geological Park, the south end of Upper Matecumbe Key in Lignumvitae Key Botanical State Park, and Snake Creek Hammocks in the Florida Keys Wildlife and Environmental Area (managed by the Florida Fish and Wildlife Conservation Commission) (Gann et al. 2002; The Institute for Regional Conservation 2004; K. Bradley, pers. comm. The Institute for Regional Conservation 2005). These sites are all in the upper Florida Keys, Monroe County, Florida.

LEAD REGION CONTACT: Richard Gooch, 404-679-4124

LEAD FIELD OFFICE CONTACT: South Florida Ecological Services Office, David Martin, 772-562-3909 ext 230

BIOLOGICAL INFORMATION:

Species Description: "*I. mucronata* var. *keyensis* is a scrambling to erect annual or probably perennial herb to 1 m [3 feet] tall; stem strigulose; leafstalk 1.5-2.5 (-4) cm [0.6-1.0 (-1.6)

inches] long; leaflets ca. 5, paired, elliptic, 0.7-1.8 cm [0.3-0.7 inch] long, strigulose on both surfaces; stipules setaceous, 5-8 mm long; racemes exerted, lax, with few to numerous flowers, shortly pedunculate; pedicels 1-2 mm [0.04-0.08 inch] long; calyx 2-2.5 mm [0.08-0.1 inch] long, lobes lanceolate, longer than the tube; corolla pink to salmon, 6-7 mm [0.23-0.28 inch] long; legume [seed pod] dehiscent, oblong, straight or falcate, turgid, 3-4.5 cm x 2.5 mm [1.2-1.8 inches x 0.1 inch], slightly strigulose." (Bradley and Gann 1999, adapted from Isely 1990).

Contrary to some reports in the literature, this plant is not a vine. The reports are probably based on misidentified specimens of *Indigofera miniata* (Bradley and Gann 1999). Such misidentifications are probably also the source of reports in the literature (Austin 1980, Isely 1990) that this is a common, weedy species in Florida (Bradley and Gann 1999).

Taxonomy: The systematics of this plant have changed in recent years. We followed the treatment by Isely (1990, 1998), who was an expert on the legume family in the United States.

This plant was first described by John Kunkel Small (1913) as *Indigofera keyensis*, based on specimens collected on Lower Matecumbe Key in 1907. "Isely (1982) recognized that the plant was similar to the tropical *I. mucronata* of the West Indies, and treated it as a variety of that species, *I. mucronata* var. *keyensis*. In a revision of Southeast Asia *Indigofera*, de Kort and Thijsse (1984) included *I. mucronata* as a [nomenclatural] synonym of *I. trita* ssp. *scabra*. Kartesz and Gandhi (1990) felt that this taxon [i.e., the Keys plants] did warrant status as a unique variety, but point out that *I. mucronata* DC. was a later [nomenclatural] homonym of *I. mucronata* Lamarck, making Isely's combination [*I. mucronata* var. *keyensis*] illegitimate. They published a new combination, *I. trita* L. var. *keyensis* (Small) Kartesz & Gandhi. Isely (personal communication in Kartesz and Gandhi 1990) apparently did not agree with this solution, believing that the de Kort and Thijsse study of New World materials to be incomplete." (Bradley and Gann 1999). Isely (1990) thus retained the name *I. mucronata* var. *keyensis*.

A dissertation on *Indigofera* in the New World was completed in 1993 (Lievens 1993), and Dr. Lievens is preparing a treatment of Indigofera for the Flora of North America. Wunderlin and Hansen (2003) have adopted the name *Indigofera mucronata* for this plant. The U.S. Department of Agriculture's PLANTS database and the ITIS database (ITIS 2004) use *Indigofera trita* var. *keyensis*. Because of this divergence in taxonomic opinion, it would be prudent to conduct a taxonomic review before proceeding with listing. If the Keys plants represent a distinct variety (presumably under the name *Indigofera trita* var. *keyensis*), they are eligible for Federal listing. If the Florida Keys plants are not distinct from those elsewhere in the Caribbean region, then they are not eligible for Federal listing, since *Indigofera trita* subsp. *scabra* as treated by de Kort may be widespread in tropical America. Under the Endangered Species Act, a plant taxon (full species, subspecies, or variety) must be listed throughout its range. It appears that the name *Indigofera mucronata* cannot be used for the plant native to the Florida Keys, but we are retaining this name for the candidate form for the sake of consistency with past usage.

With the Florida Department of Agriculture and Consumer Service's Endangered Plant Advisory

Council continuing to support the Department's listing of this plant as *Indigofera keyensis*, we believe it is prudent to continue to assume that this plant is a Florida endemic until taxonomic questions can be assessed more fully. We are not aware of taxonomic work underway on this plant, other than Lievens' treatment for the Flora of North America.

Habitat: *Indigofera mucronata* var. *keyensis* is found at edges of rockland hammock (Small 1933), coastal berm, and rock barren communities in the upper Florida Keys (Bradley and Gann 1999). Coastal rock barren is an open community with no tree canopy and a sparse subcanopy of understory hardwoods. Most of the area is composed of exposed Key Largo Limestone with a diverse assemblage of herbaceous plant taxa, many of which are halophytes. The origin of this community is not understood. It seems possible that periodic storm events are responsible for maintaining coastal rock barrens (Bradley and Gann 1999).

Historical Range/Distribution: *Indigofera mucronata* var. *keyensis* was historically distributed in the upper and middle Florida Keys from Key Largo to Knight Key in Monroe County, Florida. It has been collected or reported on 11 islands, including Crawl Key, Key Largo, Knight Key, Lignumvitae Key, Long Key, Long Point Key, Lower Matecumbe Key, Plantation Key, Upper Matecumbe Key, Vaca Key, and Windley Key. It historically occurred on Lignumvitae Key Botanical State Park and has been extirpated from the Park's Klopp tract (The Institute for Regional Conservation 2004). Gann et al. (2002) also note two nineteenth-century collections, one from Miami north of the Keys, and from what appears to be Marco Island in Collier County, which is now heavily developed. These collections indicate that the historic distribution of this plant included Collier and Miami-Dade Counties.

Current Range/Distribution: Florida indigo is currently known from Crawl Key (private), John Pennekamp Coral Reef State Park on Key Largo, Long Key State Park, Long Point Key (private), Plantation Key (private), and Windley Key Fossil Coral Reef State Geological Park, and Snake Creek Hammocks in the Florida Keys Wildlife and Environmental Area (managed by the Florida Fish and Wildlife Conservation Commission) (K. Bradley, The Institute for Regional Conservation, pers. obs. 2004) (Gann et al. 2002, The Institute for Regional Conservation 2004). A population was discovered October 11, 2005, by Stephen Hodges and Erik Fleites of The Institute for Regional Conservation at Teatable Hammock at the south end of Upper Matecumbe Key (K. Bradley, pers. comm. 2005) on property belonging to Lignumvitae Key Botanical State Park. The most complete discussion of this plant's historic and present distribution and conservation needs is in Gann et al. (2002), with updates in The Institute for Regional Conservation (2004).

Population Estimates/Status: Crawl Key has up to 1,000 plants on a rock barren, John Pennekamp Coral Reef State Park has up to 10 plants, Long Point Key has 3-4 plants, Plantation Key has up to 100 plants, Windley Key Fossil Coral Reef State Geological Park has up to 10 plants, and an unknown number at Snake Creek Hammocks (Gann et al. 2002, The Institute for Regional Conservation 2004). A population was discovered October 11, 2005 at the south end of Upper Matecumbe Key (K. Bradley, pers. comm. 2005) no numbers have been reported yet. This plant is considered "critically imperiled" by both the Florida Natural Areas Inventory and

The Institute for Regional Conservation (Gann et al. 2002).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. Only eight occurrences of *Indigofera mucronata* var. *keyensis* are currently known and no more than 1,000 individuals are estimated to exist. The coastal rock barrens where populations occur at Long Key State Recreation Area and Windley Key Fossil Reef State Geological Site are being invaded by native and exotic hardwoods. There are probably similar threats at the Florida Keys Wildlife and Environmental Area.

B. Overutilization for commercial, recreational, scientific, or educational purposes. None known.

C. Disease or predation. None known.

D. The inadequacy of existing regulatory mechanisms. The Florida Department of Agriculture and Consumer Services designated *Indigofera keyensis* as endangered under Chapter 5B-40, Florida Administrative Code. This listing provides little or no habitat protection beyond the State's Development of Regional Impact process, which serves to disclose impacts from projects, but provides no regulatory protection for State-listed plants on private lands. Without local or county ordinances preventing the destruction of the plant, conservation does not occur.

E. Other natural or manmade factors affecting its continued existence. Exotic pest plants negatively affect *Indigofera mucronata* var. *keyensis* throughout its range. At least 162 taxa of exotic plants are now known to invade *Indigofera mucronata* var. *keyensis* habitat (U.S. Fish and Wildlife Service 1998). On Long Point Key, encroaching Brazilian pepper (*Schinus terebinthifolius*) threatens to close over the opening where a small population of *Indigofera mucronata* var. *keyensis* occurs. It is unlikely this population will survive another decade under current conditions (Ross and Ruiz 1996). Latherleaf (*Colubrina asiatica*) could also severely affect this species (Bradley and Gann 1999). Janice Duquesnel of the Florida Park Service commented in April 2005 that *Indigofera mucronata* var. *keyensis* at Long Key State Park is on a cactus barren that has several rare species. The area inhabited by Florida indigo was treated for Brazilian pepper using herbicides and mechanical removal. Exotic pest plants are expected to be treated using the same methods at Pennekamp and Windley Key State Parks. Fire is not an appropriate treatment method in coastal barren vegetation. Duquesnel reports that during a facilities construction project on the Klopp tract of Lignumvitae Key Botanical State Park, contractors using mechanical methods to remove Brazilian pepper and lead tree (*Leucaena leucocephala*) damaged or destroyed state-listed or sensitive plants that had been flagged, including *Indigofera.* This is unusual because considerable effort had been made to prevent or minimize damage and corrective action was quickly taken. Management of exotic plant invasion is crucial to the conservation of this species.

Without proper control and eradication of these exotic plants, they become tall and dense creating inappropriate habitat for *Indigofera mucronata* var. *keyensis*. Due to its narrow range and small number of individuals, *Indigofera mucronata* var. *keyensis* is vulnerable to natural events such as hurricanes, which could extirpate existing populations, or, alternatively rehabilitate coastal barrens habitat.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Although the *Indigofera mucronata* var. *keyensis* populations located on public lands are protected from development, they are under threat from exotic vegetation. The Service and the State have supported control programs. There are no specific conservation activities for *Indigofera mucronata* var. *keyensis* on public lands. There are no current conservation activities for the one *Indigofera mucronata* var. *keyensis* population on private land.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

This plant is rare, being known in only small numbers from eight sites, which are vulnerable to invasive exotic pest plants (such as Brazilian pepper), development, and hurricane disturbances. This species is vulnerable to management accidents, even on protected lands.

For species that are being removed from candidate status:

____Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

Acquire and manage rockland hammock edges, coastal berm, and rock barren communities in the Florida Keys. Exotic pest plants, especially Brazilian pepper may be the most serious problem once these areas are protected from development.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	8
		Subspecies/population	**9***
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:
Magnitude: This is a rare plant, inherently vulnerable to extinction because of its limited numbers. Eight populations exist. The largest known population, on private land, comprises up to 1,000 individuals. Its habitat is being invaded by exotic pest plants. On public conservation lands, invasive exotic species are being controlled in some areas and populations of this species, although small, have appeared stable in recent years. Populations on both private and public lands are subject to hurricanes, with their subsequent storm surges. Overall, the threats to this plant variety are moderate.

Imminence: Exotic pest plants, particularly Brazilian pepper and latherleaf, are a chronic problem. Brazilian pepper tends to take over coastal areas that are not regularly managed, and latherleaf may still be an increasing threat. The small sizes of existing populations, especially on conservation lands, leave Florida indigo highly vulnerable to any lapses in management, so threats are imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. It would not be prudent to proceed with preparing a listing proposal until doubts are resolved as to whether this constitutes a taxon endemic to the Florida Keys.

DESCRIPTION OF MONITORING
Monitoring of plants on State Park properties is conducted every five years, with the next data

collection to be conducted in 2006. The Service remains in contact with land managers in the Keys. The Florida indigo is still found in coastal rock barren habitat at Windley Key and Long Key State Parks. The coastal rock barren at Windley Key is small, and exotic pest plants, such as Brazilian pepper, have been controlled. The small population of Florida indigo is inherently vulnerable to changes in vegetation and to storms. At Long Key, the population is threatened by exotics such as Brazilian peppers (which are expected to be removed) and encroachment of hardwoods into the habitat. In John Pennekamp Coral Reef State Park, a major exotic removal project has been conducted recently on a coastal rock barren on the ocean side of El Radabob Key where the indigo occurs.

At Lignumvitae Key Botanical State Park, Florida indigo was found in open, disturbed habitat surrounded by exotics. The indigo population was apparently destroyed during removal of exotic plants, but Park personnel later found individuals in the same vicinity as the original population. The planned entrance road for the Park was moved to minimize the number of plants that would be affected; affected indigo plants were removed for transplanting, but did not survive. The latest visit to the site in 2004 revealed no new indigo individuals.

In other State parks, the status of the coastal rock barren habitat is for the most part good, ensuring that suitable habitat for Florida indigo remains. Therefore, it is possible that the indigo may be found at a few additional sites.

The Florida Department of Environmental Protection's State Parks and the Keys Wildlife and Environmental Area have been funded by the Florida Bureau of Invasive Plant Management to remove exotic pest plants, including funding for follow-up treatments (Florida Department of Environmental Protection 2004). This has reduced threats by exotic pest plants to the natural vegetation of State Parks and their flora, including Florida indigo.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: none

Indicate which State(s) did not provide any information or comments: Florida

LITERATURE CITED

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Gainesville. 806 pages.

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Wunderlin, R. P. and B. F. Hansen. 2003. Atlas of Florida Vascular Plants. Online, http://www.plantatlas.usf.edu/. Entries for *Indigofera* consulted February 27, 2003 and June 8, 2004.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: South Florida (Vero Beach) Field Office